

I claim:

1. A transmission comprising,
  - an input drive shaft, the input drive shaft being elongated along and rotatable about an axis,
  - an elongated output shaft, the output shaft being rotatable about and coaxial with the axis,
  - an input sun gear being selectively rotatable about the axis,
  - a one-way clutch coupled to the input shaft for rotation therewith and selectively engaging the input sun gear, the one-way clutch operable to rotate the input sun gear in forward rotation about the axis when the input drive shaft is rotated about the axis at a faster forward rate than the output drive shaft,
  - an output sun gear spaced axially from the input sun gear, the output sun gear being selectively rotatable about the axis,
  - an output gear brake assembly selectively operable to permit or prevent rotation of the output sun gear radially about the axis,
  - a first clutch assembly including,
    - a first clutch drum assembly including a first selectively actuatable clutch piston coupled to the input shaft for rotation therewith, and
    - a first clutch plate array activatable by said first clutch piston to couple the first drum assembly and said output drive shaft,
  - a second clutch assembly including,
    - an annular ring gear having an annularly extending toothed ring gear surface extending radially about and spaced from the axis,
    - a second selectively actuatable clutch piston coupled to the ring gear for rotation therewith, and
    - a second clutch plate array activatable by said second clutch piston to couple the ring gear to the first drum assembly for rotation therewith,
  - a ring gear brake assembly selectively operable to permit or prevent rotation of the ring gear,
  - a planetary gear assembly comprising,

a planet gear carrier fixed to said output shaft for rotation  
therewith,

a first set of planetary gears rotatably mounted on said planet gear carrier and meshing with a portion of said input sun gear, and

a second set of compound planet gears rotatable mounted on said planet gear carrier, each second compound gear comprising,

a first diameter portion and a second diameter portion spaced axially from the first diameter portion, the first diameter portion interposed between and meshing with an associated one of said first planetary gears and said toothed ring gear surface, the second diameter portion meshing with said output sun gear.

2. The transmission as claimed in claim 1, wherein the second diameter portion of each compound planetary gear has a diameter selected greater than a diameter of the first diameter portion.

3. The transmission as claimed in claim 2, wherein the input sun gear has a number of radially extending gear teeth selected less than that of the output sun gear.

4. The transmission as claimed in claim 3, wherein the input planetary gears have a number of radially extending gear teeth selected substantially equal to a number of radially extending gear teeth along the first diameter portion of the associated compound planetary gear.

5. The transmission as claimed in claim 1, further including a hydraulic fluid supply for selectively providing fluid to the first and second clutch pistons to activate a respective first and second clutch array.

6. The transmission as claimed in claim 1, further including a plurality of pin shafts, each pin shaft having a pin axis substantially aligned with said axis and rotatably mounting a respective one of said first planetary gears and said second compound gears to said planetary gear carrier for rotation about the pin axis.

7. The transmission as claimed in claim 1, wherein said first set of planetary gears comprises four planetary gears mounted to said planetary gear carrier at substantially equally radially spaced locations about said axis.

8. The transmission as claimed in claim 1, wherein the output sun gear is radially disposed about the output shaft.

9. The transmission as claimed in claim 8, wherein the output sun gear includes a radially extending brake drum, and the output gear brake assembly comprises a fluid activated brake band which is selectively movable into and out of engaging contact with the brake drum.

10. A light vehicle drive assembly comprising,  
a vehicle engine having an engine output shaft,  
a transmission comprising,

- a transmission housing having an opening extending axially therethrough,
- an elongated input drive shaft and output drive shaft being coaxially aligned in said opening, each of the input drive shaft and output drive shaft being elongated along and rotatable about the axis,

- a linkage rotatably coupling the engine output shaft and the input shaft,
- an input sun gear being selectively rotatable about the axis,
- a one-way clutch coupled to the input shaft for rotation therewith, the one-way clutch engaging and rotating the input sun gear in forward rotation about the axis only when the input drive shaft is rotated about the axis at a faster forward rate than the output drive shaft,

- an output sun gear disposed about the axis and being selectively rotatable about the axis,

- an output gear brake assembly selectively engageable with the output sun gear to permit or prevent rotation of the output sun gear relative to said housing,

- a first clutch assembly including,

a first clutch drum assembly including a clutch drum coupled to the input shaft for rotation therewith,

a first selectively actuatable clutch piston mounted to said first clutch drum, and

a first clutch plate array activatable by said first clutch piston to rotatably couple the first drum assembly and said output drive shaft,

a second clutch assembly including,

an annular ring gear having an annularly extending toothed ring gear surface extending radially about and spaced from the axis,

a second selectively actuatable clutch piston coupled to the ring gear for rotation therewith, and

a second clutch plate array activatable by said second clutch piston to couple the ring gear to the first drum assembly for rotation therewith,

a ring gear brake assembly selectively operable to permit or prevent rotation of the ring gear relative to said housing,

a planetary gear assembly comprising,

a first set of planetary gears rotatably mounted on said planet gear carrier and meshing with a portion of said input sun gear, and

a second set of compound planet gears rotatably mounted on said planet gear carrier, each second compound gear comprising,

a first diameter portion and a second diameter portion spaced axially from the first diameter portion, the first diameter portion interposed between and meshing with an associated one of said first planetary gears and said toothed ring gear surface, the second diameter portion meshing with said output sun gear.

11. The drive assembly as claimed in claim 10, wherein the engine output shaft is rotatable about an output shaft axis parallel to the axis of elongation of the transmission input shaft.

12. The drive assembly as claimed in claim 10, wherein the second diameter portion of each compound planetary gear has a diameter selected greater than a diameter of the first diameter portion.

13 The drive assembly as claimed in claim 10, wherein the input sun gear has a number of radially extending gear teeth selected less than that of the output sun gear.

14. The drive assembly as claimed in claim 13 wherein the input planetary gears have a number of radially extending gear teeth selected substantially equal to a number of radially extending gear teeth along the first diameter portion of the associated compound planetary gear.

15. The drive assembly as claimed in claim 14, further including a hydraulic fluid supply for selectively providing a fluid to the first and second clutch pistons to activate a respective first and second clutch array.

16. a transmission comprising,  
a transmission housing having an elongated opening extending along an axis therethrough,  
an elongated input drive shaft rotatably disposed in said opening,  
an output drive shaft being coaxially aligned,  
an input sun gear disposed radially about the axis and being selectively rotatable,  
a one-way clutch coupled to the input shaft for rotation therewith, the one-way clutch engaging and rotating the input sun gear in forward rotation about the axis only when the input drive shaft is rotated about the axis at a faster forward rate than the output drive shaft,  
an output sun gear disposed radially about the output shaft and being selectively rotatable about the axis,  
an output gear brake assembly selectively engageable with the output sun gear to permit or prevent rotation of the output sun gear relative to said housing,  
a first clutch assembly including,  
a first clutch drum assembly including a clutch drum coupled to the input shaft for rotation therewith,

- a first selectively actuatable clutch piston mounted to said first clutch drum assembly,
- a first clutch plate array activatable by said first clutch piston to rotatably coupled the first drum assembly and said output drive shaft,
- a second clutch assembly including,
  - an annular ring gear having an annularly extending gear surface extending radially about and spaced from the axis,
  - a second selectively actuatable clutch piston coupled to the ring gear for rotation therewith, and
  - a second clutch plate array activatable by said second clutch piston to couple the ring gear to the first clutch drum for rotation therewith,
  - a ring gear brake assembly selectively operable to permit or prevent rotation of the ring gear relative to said housing,
  - a planetary gear assembly comprising,
    - a planet gear carrier fixed to said output shaft for rotation therewith,
    - a first set of planetary gears rotatably mounted on said planet gear carrier and meshing with a portion of said input sun gear, and
    - a second set of compound planet gears rotatably mounted on said planet gear carrier, each second compound gear comprising,
      - a first diameter portion and a second diameter portion spaced axially from the first diameter portion, the first diameter portion interposed between and meshing with an associated one of said first planetary gears and said toothed ring gear surface, the second diameter portion meshing with said output sun gear.

17. The transmission as claimed in claim 16, wherein the one-way clutch comprises a sprag gear assembly.

18. The transmission as claimed in claim 17, wherein the second diameter portion of each compound planetary gear has a diameter selected greater than a diameter of the first diameter portion, and the input sun gear has a radial diameter selected less than a radial diameter of the output sun gear.

19. The transmission as claimed in claim 16, wherein the input planetary gears have a number of radially extending gear teeth selected substantially equal to a number of radially extending gear teeth along the first diameter portion of the associated compound planetary gear.

20. The transmission as claimed in claim 16, further including a plurality of pin shafts, each pin shaft having a pin axis substantially aligned with said axis and rotatably mounting a respective one of said first planetary gears and said second compound gears to said planetary gear carrier for rotation about the pin axis.